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ORGANIZATIONAL CONTROL SYSTEMS AND PRODUCTIVITY: ANNUAL REPORT, OCTOBER, 1981

WILLIAM G. OUCHI
PRINCIPLE INVESTIGATOR

Research sponsored by Organizational Effectiveness Research Programs, Office of Naval Research (Code 452), under Contract No. N00014-81-K-0035; NR 170-920

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The report discusses recent work in the sponsored research. This includes: (1) the development of the conceptual framework of the research, (2) a brief review of the histories of the United States and Japanese electronics industries, (3) a descriptive, taxonomic study of the two industries to develop a sampling frame, (4) an efficiency model analysis at inter-firm ownership in the electronics industry, (5) an efficiency model analysis of inter-bank relations in the two cultures, and (6) a trade association study. The report

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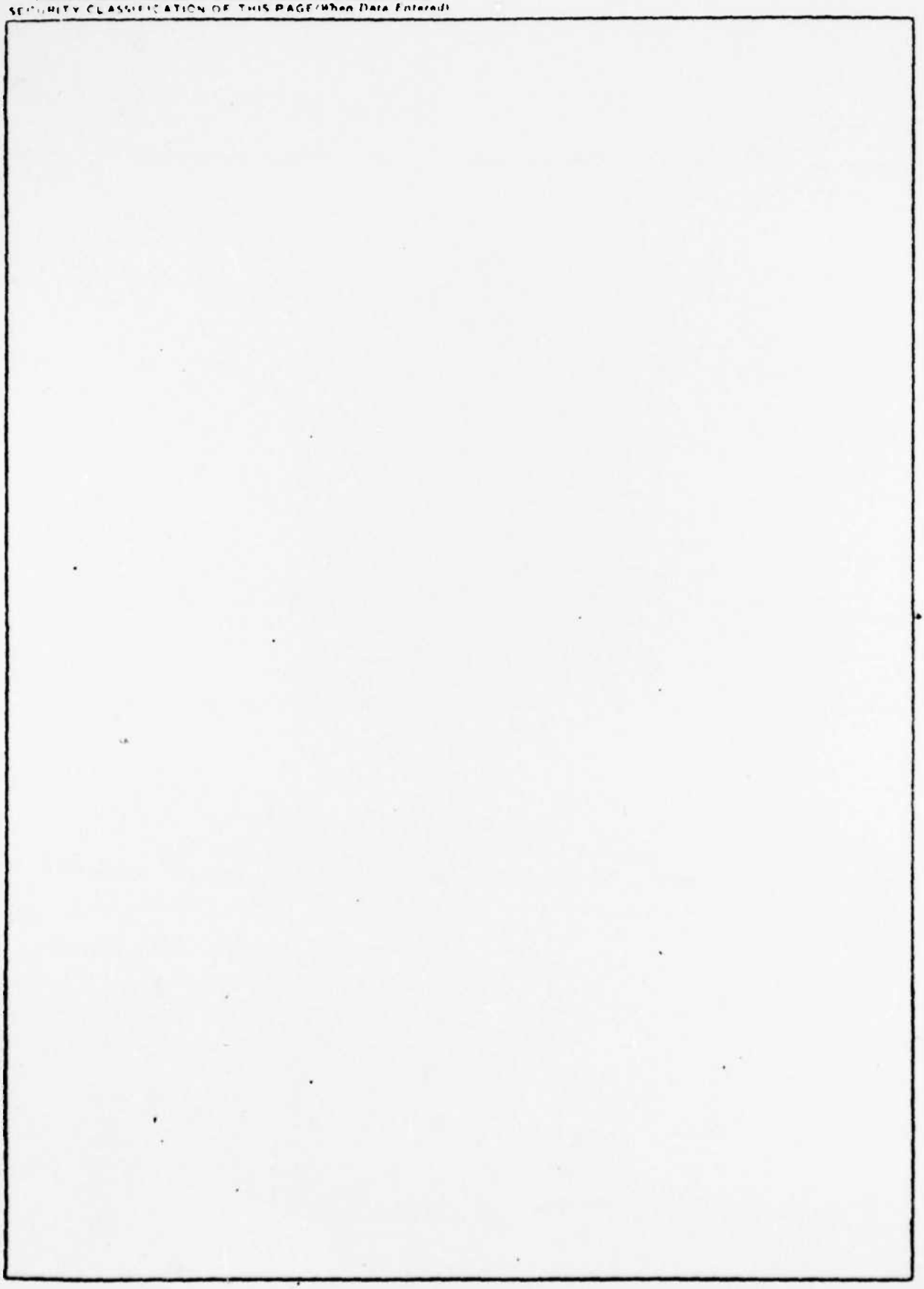

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I. INTRODUCTION

Recent publication of several books on Japanese industry (Vogel, 1979; Ouchi, 1981, Pascal and Athos, 1981) has sparked widespread interest throughout the United States in Japanese management and its relation to productivity. While these and other works are important in describing the style of many Japanese managers, they may not tell the whole story of apparent Japanese efficiency, effectiveness, and productivity. A recent review of some of this work in the Asian Wall Street Journal (1981) noted the importance of understanding management practices and their relation to productivity, but suggested that Japanese success could not be fully understood without also considering relations between Japanese firms and between industry and government in Japan. This review noted that,

> In focusing exclusively on the role of management in Japan's success, (we) may neglect to mention many other contributing factors. Among these are the relatively weak Japanese anti-trust laws; government sponsorship of favored industries; a high rate of savings in Japan, which makes capital cheap, and the large shareholdings in major corporations by Japanese banks, which are often willing to forego fat dividends until the firm has carved out an unchallengeable market share.
> (Asian Wall Street Journal, June 29, 1981, p. 11)

The primary purpose of this report is to describe progress in a research project that is being undertaken at the Graduate School of Management at UCLA, under the sponsorship of the Organizational Effectiveness Research Program, Office of Naval Research (Contract No. N00014-81-K-0035; NR 170-920) that begins to address some of these issues. This project has, as its primary objective, an understanding of the efficiency and effectiveness characteristics of relations between firms and between firms and the government in the U.S. and Japanese electronics industries. With this understanding, we hope that efficient and effective interorganizational relations can be described, with a long range objective of implementing such relations where appropriate. This report reviews progress in the project in several sections. We begin by introducing the general theoretical framework that guides the research. Next, we present a brief historical review of the United States and Japanese

electronics industries. Following this, several specific research studies that together form the bulk of the project are reviewed. The first three of these studies have progressed more quickly and will be discussed in more detail. As appropriate, empirical results will be reported.

II. THEORETICAL FRAMEWORK

An emerging organization theory framework that generates important insights into the analysis of cooperative relations between firms and between industries and government was originally developed in economics by Williamson (1975; 1979). Known by various names, including the transaction costs framework, the organizational failures framework, and the efficiency model, this perspective on organizations is the conceptual base for our empirical comparisons of the United States and Japanese electronics industries. This framework, and its relevance to the research described below, is being more fully developed for organizational analysis in papers authored by members of the research team (Barney and Ouchi, 1981; Barney and Ulrich, 1981). Reviews of the broader transaction costs model can be found in Ouchi (1980) and Williamson (1979). We will introduce and briefly describe this conceptual framework with an example of an application of an efficiency hypothesis.

Consider first an example of inter-firm relations in the United States electronics industry. Suppose a computer manufacturer became aware of a new and powerful semi-conductor chip uniquely manufactured by a pacticular LSI company and wished to design this new chip into its next generation computers. The computer firm in the United States may be reluctant to design its new machine around this new device, fearing that once this takes place, it will be at the mercy of its sole supplier of this chip. Once the computer firm makes the design investments, they often cannot be changed to incorporate new LSI devices without considerable expense. Under these conditions, the chip manufacturer could raise prices, lower quality, or provide poor service, all without unduly jeopardizing the sale of its device to the computer manufacturer.

Three alternatives immediately present themselves to the computer manufacturer. First, they may decide not to incorporate the new chip into

its design, and thus avoid any sole supplier relations. Unfortunately, this may also lead to bringing an inferior product to market. Second, the computer firm may acquire the chip manufacturer. Such vertical integration seems likely to insure stable low cost supplies of the device to the computer firm, but may have some secondary negative consequences. For example, the computer firm may not have LSI manufacturing competence. Vertical integration might entail a rise in chip manufacturing costs. Also, whereas LSI research and development was the sole interest of the separate semi-conductor firm, LSI development in the vertically integrated firm may only be a small percentage of total R & D expenditures. Under such conditions, the vertically integrated firm may be less innovative in LSI technology than the separate semi-conductor firm. The third option open to the computer firm may be to require the semi-conductor manufacturer to license another firm to also manufacture the new device, in exchange for a guarantee that the computer firm buys most of the new devices it uses from the original semi-conductor firm. Such "second sourcing", though common in the United States electronics industry, is fraught with difficulties. First, it is often difficult to find a semi-conductor firm willing to manufacture the new device under such restrictions. Second, because these devices are so complex, it may be difficult to transfer all the knowledge and understanding necessary to the second source for it to manufacture a high quality product. Moreover, the original semi-conductor firm may choose not to transfer all the relevant information to insure that the second source manufactures an inferior product. Also, because of the complexity of the manufacturing process and the amount of proprietary information, the computer firm may not be able to adequately police the development of a second source of high quality.

In Japan, computer manufacturers facing a similar situation could also adopt one of these three alternatives. Indeed, tentative research indicates that vertical integration is a common solution to this particular single sourcing problem in Japan. However, two additional alternatives may be available to the Japanese firm that may not be available to United States firms. First, Japanese computer manufacturers might be able to call on a

third party to mediate the exchange and insure that both parties were dealt with equitably. This third party would have to have intimate knowledge of both parties to the exchange. It would also have to be trusted to decide ambiguous and complex issues in ways that would assure long-term equity in the exchange. Lifson (1981) shows how this third party guarantor helps assure equitable relations within large Japanese firms. Such guarantees might also exist between firms. At the firm level, this third party could be the government, but is more likely to be a bank that has substantial holdings in both firms and enjoys a long-term, stable, and intimate relations with both firms. If either firm behaves in a way so as to jeopardize an equitable exchange, the bank may take appropriate action. Second, the potential problems associated with single source relations could be considerably lessened in the two firms in Japan if they had mutual and joint interests in maintaining a long term equitable exchange. This could occur, for example, if each firm held substantial amounts of stock in the other firm, thus increasing the likelihood of cooperation between firms.

In the above example, we have described five ways a particular exchange could be governed: the exchange could not take place, it could be governed through a common hierarchy (vertical integration), through a quasi-market mechanism (second sourcing), or through one of two "intermediate" forms of governance. These governance mechanisms are pictured in Figure 1. The last forms of governance are basically market in nature, but are assisted by hierarchical or corperative mechanisms. In the intermediate cases, firms remain separate, but ambiguous or complex exchange issues are mediated by a third party with an interest in maintaining an equitable relationship, the bank, or firms recognize their joint interest in maintaining such a relationship due to interdependent ownership.

Much of our research is that the hypothesis underlying certain governance mechanism are differentially efficient, depending on some specifiable characteristics of particular transactions. In the above example, five alternative governance mechanisms are suggested. There may be others as well. Transaction characteristics that have a differential impact on governance efficiency have have been isolated by Williamson (1975, 1979), Ouchi (1980), and Barney and Ouchi (1981). Through the research, the development and matching of transaction characteristics and governance mechanisms will continue in an empirical context.

III. HISTORIES OF THE UNITED STATES AND JAPANESE ELECTRONICS INDUSTRIES

The United States electronics industry has grown rapidly since its inception in the early 1940's. In many ways, one could argue that the industry originated with the first modern digital computers, Mach I and ENIAC. In the 1940's, leading electronics technology included vacuum tubes and was prinicipally applied to information processing in the military. In the 1950's, transistors were a major technical innovation. Products such as silicon transistors were developed by Texas Instruments in 1954 and continued to predominantly serve the military and aerospace markets. Throughout the 1960's, technical innovations such as the Integrated Circuit (IC), Medium Scale Integration (MSI), and Large Scale Integration (LSI) became dominant technologies, often used in both military and non-military computer markets. In the 1970's and into the 1980's, Intel Corporation maintained a technical lead in a rapidly evolving market with Very Large Scale Integration (VLSI). Such semi-conductor devices are currently used in a variety of applications, from automobiles to office machinery (United States, Department of Commerace, 1979; Brittain and Freeman, 1980). Current projections indicate that the electronics industry should remain one of this country's most valuable assets and critical industries through the 1980's (Office of Technological Assessment, 1981).

Fairchild Publications reports annually on the United States electronics industry by summarizing the reports filed by public firms (10-K, corporate reports) in a book entitled The Electronic News Financial Fact Book and Directory. In the 1980 edition, this text included summary information on 684 firms.

The Japanese electronics industry began in the mid-1950's with the Ministry of International Trade and Industry (MITI) sponsoring electronics research. MITI founded the Research Committee on Computers, comprised of prospective manufactureres, industry leaders, and research scientists, to study Japan's investment in the electronics field. However, real growth in Japanese electronics industry began in the mid-1960's. By this time, IBM had developed the System 360 computer. This machine highlighted both the future relevance of electronic technology and Japan's lack of technological

development vis-a-vis the United States industry. As the importance of the electronics industry became clear, MITI began to allocate resources to firms research and development and manufacturing. Firms such as Japan Electronic Computer Corporation, Japan Software Company (a joint venture of Fujitsu, Hitachi, and Nippon Electric), Toshiba, and Iki all received government support for electronics development. As a result, these firms began to invest great amounts of time and resources to develop, manufacture, and market new electronics technologies. In the 1970's, the Japanese electronics industry continued to grow rapidly. In 1974, MITI published a document entitled, Japan's Industrial Structure -- A Long Range Vision which reviewed Japan's commitment to the electronics industry:

> The computer, which will form the core of informationalization, will probably record an especially large expansion in demand as informationalization progresses in industry, in society, and in the people's lives. . . . The role played by imported technology centering on technology in the electronics industrial fields has been very important, but now that Japan has reached the same general technological level as Europe and America, the self-development of technology will be a big issue for the future. (pp. 71-72)

Japan has been successful in its endeavors to develop technology and capture world market share in electronics. Its world market share has increased significantly in the last decade. Dr. Robert Noyce, Vice-Chairman, Intel Corporation, testified before the Subcommittee on International Finance of the Committee on Banking, Housing, and Urban Affairs of the United States Senate that one of the major challenges the United States electronics industry in the 1980's faces in the rapid technological and market growth of the Japanese industry (Kaplan, 1972; Noyce, 1980).

The Oriental Economist publishes a book that summarizes many Japanese firms similar to that published by Fairchild Publications. This book, entitled Japan Company Handbook, includes summaries of public information on approximately 125 Japanese electronics firms.

Two relevant points should be highlighted from the above brief historical overview of the United States and Japanese electronics industries. First, both industries have become very complex. The products produced by the industries, and the number of firms in each have grown very rapidly with new applications of electronics technology. Second, despite their parallel

growth, the United States and Japanese industries have evolved very differently. While the United States industry has grown through technological developments taking place in independently acting firms, the Japanese industry has grown with close cooperation between government and business and, in addition, cooperation across firms in the industry.

IV. ELECTRONIC INDUSTRY STUDY PROJECTS

The above discussion lays the foundation for a group of hypotheses that remain to be tested in our analysis of the United States and Japanese electronics industry. To test these hypotheses, several specific research studies have been designed. These are discussed below.

A. Taxonomy of United States and Japanese Electronics Industries

Recent work in organization theory (McKelvey, in press) and competitive strategy (Porter, 1980) recognizes the importance of classification of firms into populations. These populations of firms allow both theoretical and practical insights into a firm to be developed. McKelvey argues that taxonomies will help develop the science of organizations, provide a basis for data retrieval about organizations, increase the generalizability and predictability of organization studies, and provide a basis for sampling in organization studies. Porter, in a more practical vein, proposes that managers who recognize their strategic group (population) can make improved strategic decisions. These strategic decisions include selecting suppliers, customers, and employees, recognizing competition, and identifying alternative operating decisions on product mix, speed of entry into a market, and evaluation of barriers to entry. In brief, the population concept helps firms assess their niche within an industry (Ulrich, 1981).

In the sponsored research, data is being collected on 684 United States and 125 Japanese electronics firms. These data, when analyzed, will yield a taxonomy of firms into populations in both the United States and Japanese industries. The data for this taxonomy comes from firm's public reports (10-K, corporate reports) over three years (1978, 1979, 1980), as reported in the Fairchild and Oriental Economist publications. The information was coded from these reports by a team of researchers at UCLA. After coding

this information, each firm was contacted by telephone and key informants verified the information derived from secondary data. By coding secondary data and then contacting the firm for verification of the coded data, confidence is high that the information in the data set is accurate and reliable. This data set should by on-line by October 1, 1981 and preliminary results should be available by mid-September.

These data will yield a taxonomy which will provide a comprehensive and detailed description of the two industries. The taxonomy will be based on information outlined in Table 1 (see a copy of the survey in Appendix A of the report). This data can be placed in a firm-by-variable matrix so a classification of firms can be derived (see Figure 2). An attempt will be made to accomplish this classification using appropriate clustering algorithms. Commonalities and subtle differences between firms will be identified via the clustering programs. For example, some United States firm's (e.g. Silicon Systems Incorporated) sole relationship to the electronics industry is through the design and manufacture of components which are then sold to customers outside the firm (e.g. General Electric). Firms in this supplier category are likely to be clustered into one population, while firms operating in more markets and more complex technologies (e.g. Westinghouse) are likely to be clustered into another population.

The taxonomies of the United States and Japanese industries may show some interesting differences. Since the United States industry began with individual firms competing for resources, while Japanese firms collaborated through the government support in developing the industry, one hypotheses would be that more diverse populations of firms would exist in the United States than in Japan. The United States electronics industry will likely have more populations of firms which specialize within the electronics industry. This diversity will likely be grouped into more distinct, large populations. The populations which are identified will be one of the foremost analytical efforts made to describe in depth a major United States and Japanese industry. It should begin to identify some of the structural differences between industrial development in the two cultures. The populations will also serve as a sample frame for future research which will describe in more detail transactions between firms in the industry.

B. Ownership Patterns between Electronics Firm

As indicated, in addition to collecting structural, market, and technology information, which will then be used in defining populations, data will also be collected on patterns of stock ownership in the United States and Japanese electronic industries. In the United States, all beneficiary owners (more than 5%) are required to file with the Securities Exchange Commission. For Japanese electronics firms, information on major shareholders is also public. Ownership information has been compiled for all 684 United States and 125 Japanese firms.

The ownership data should begin to reveal some significant differences between the United States and Japanese electronics industries consistent with our theoretical framework outlined above. First, since many of the United States firms were developed by technological entrepreneurs, our research should find much of the stock ownership maintained by those internal to the firm, either as a member of the firm's Board of Directors or as an officer of the firm. In contrast, since the Japanese firms have more and longer term relationships with other firms and financial sources, we would expect to find ownership patterns more widely dispersed.

Second, closer analysis of the ownership patterns will test the "Japan, Inc." hypothesis which has often been described. Firms which have major ownership in Japanese firms are likely to be those that either supply important resources or are supplied resources by the focal firm. For example, Aritsu Electric, while being an independent firm which produces telecommunications equipment, is owned by Nippon Electric (32%), its major customer, and by Sumitomo Bank and Insurance Companies (18%), its financial suppliers. The tight ownership relationships between supplier, producer, and customer may be indicative of long term, cooperative relationships which may exist within the Japanese industry and are consistent with the theoretical framework outlined above (Ouchi, 1980; Barney and Ouchi, 1981).

These hypothesized ownership patterns may begin to reveal some industry level phenomena that support and foster the Japanese management systems which are receiving so much attention currently. For example, since firms share ownership with suppliers and customers, with banks often being the mediator

or guarantor, managers may be more secure in the knowledge that their firm will very likely acquire the necessary resources to be productive over time. In addition, such ownership patterns are likely to indicate that many suppliers and customers have a vested interest to cooperate with each other. Firms with such incentives may share sensitive information about costs and prices, collaborate to maximize both firm's performance, and develop other characteristics of cooperative relationships such as goal congruence, symbolic representation of common values, and control based on traditions.

C. Inter-Bank and Bank-Firm Relations

As mentioned above, many of the supplier, firm, customer relationships in the United States are kept "arms length" and separate, while in Japan, these relationships appear to often be linked through ownership patterns and other relationships. In addition to joint ownership, it appears that Japanese firms may be linked through bank relationships. Historically, large Japanese banks have been at the center of the zaibatsu, or the more current keiretsu. The keiretsu emerged after World War II legislation against concentrated holding companies. The keiretsu do not have formal control over their members, but may affect member-firm behavior through mutual exchange of ownership shares, swapping members on the board of directors, and financial advice and assistance from the bank which is at the center of the keiretsu. Firms affiliated with a keiretsu may be able to received preferred creditt from the central financial institution. This preferred credit should allow the affiliated firms to assume more long term debt, as the financial institution which links the keiretsu need not receive immediate return on its investment in the firm. The UCLA Electronics Industry Study is currently assessing United States and Japanese bank relationships between banks and between banks and electronics firms to test some of these phypotes**es**.

In one study, we are examining ownership patterns of banks and insurance companies in Japan and New York City.[1] New York banks were selected as the American comparison to Japanese banks because New York represents a geographical area which parallels the Japanese bank systems. In addition, the New

York banks represent the center of commercial banking in the United States. All banks headquartered in New York City and all Japanese banks, were included in the sample.[2]

The following data was collected. First, a list of all Japanese banks was developed. Using information summarized in the Japan Company Handbook (1981), ownership patterns between banks were recorded. It soon became obvious that marine and fire insurance companies, as well as life insurance companies, were important types of owners in this network. These organizations were also included in the analysis. A 114 by 114 matrix was formed, called OWN. Each cell (i,j) of OWN listed the percentage of stock bank/insurance company i owned of bank/insurance company j. For example, Nippon Credit Bank stock is owned by Dai-Ichi Kangyo Bank (2.9%), Nippon Life Insurance (2.3%), Sumitomo Marine Life Insurance (2.0%), Asahi Marine Life Insurance (1.8%), Dai-Ichi Marine Life Insurance (1.8%), and Mitsubishi Bank (1.7%). This network is depicted in Figure 3.

A second network of relations among banks was also collected. This network, called REF, listed the number of times two banks were co-listed as references by the same electronics firms. This network is also depicted in Figure 3.

The two networks, OWN and REF, were then subjected to a multiple network blockmodel analysis (White, Boorman, and Breiger, 1976). The clustering algorithm used was CONCOR (Breiger, Boorman, and Arabie, 1975). A graph representation of the obtained blockmodel image matrices is represented in Figure 4.

A brief review of the graph in Figure 4 reveals a three tiered hierarchical structure. At the top of the figure (block 9), insurance companies have major holdings in all three tiers. One block of banks, (block 3), made up of large, national banks in Japan (e.g., Daiwa, Industrial Bank, Bank of Tokyo), also has substantial holdings in second and third tier banks. Second tier banks, including some national and regional banks, have substantial holdings in third tier banks. One of these blocks of third tier banks (block 8) is made up almost exclysively of Japanese savings banks. Third tier banks do not have substantial stock investments in any banks.

Turning to the co-listing of electronics firm references, it appears

that blocks 2,3, and 4 specialize in the electronics industry. Block 3 is likely to be a specialist in not only the electronics industry, but other industries as well, because it is made up of large national banks. Blocks 3 and 4 represent banks which specialize in electronics firms.

While these findings are still tentative, the shape of the graph in Figure 4, when compared to a formal organization chart, is suggestive. It appears that Japanese banks may be subject to some degree of centralized control or coordination. This relationship, manifested through patterns of ownership, exists despite the fact that each bank included in the study is a separate, incorporated entity. Thus, apparently, banks in Japan are organized in a manner somewhere between market relations (each bank a separate entity) and hierarchical relations (centralized coordination or control). Previously, this organization was referred to as an intermediate governance mechanism.

Further research must address several questions. First, how does the structure depicted in Figure 4 differ from inter-bank relations in other countries. Early analysis of the structure of inter-bank relations in the United States indicate that a few intermediate-form relations do exist. For example, when smaller United States banks are unable to carry a loan, they will often contact a correspondence bank. These correspondence banks help underwrite a particular loan that is being made. Thus the correspondence relationship appears to be an intermediate interorganizational relation of the kind described. However, common interests between corresponding banks focuses only on a relatively small set of loans shared by the two banks. Thus the common interests of correspondent banks may be relatively narrow, especially in comparison in Japanese inter-bank ownership relations. Differences between these two systems are being explored more fully. Ownership among United States banks is quite different than Japan. In the U.S., banks appear to be wholly owned subsidiaries of the same bank holding company or independently owned. Second, we must consider the dynamics that underlie the banking structure in Japan and the United States. A structure apparently exists in Japan that would facilitate inter-bank coordination, but it is still not clear if such coordination takes place. We also need to consider what

impact these patterns of inter-bank relations might have for firms in the Japanese electronics industry. Similarly, if our tentative United States analysis holds, the effect of the United States inter-bank relations also needs to be considered.

The inter-locking banking system in Japan has several important potential implications for firm behavior. One of the fears that Dr. Noyce raise in testimony before the Senate Subcommittee was the significantly higher debt/equity ratio in Japanese electronics firms that in United States electronics firms:

> The key concern of the (semiconductor) industry is its severe disadvantage in competing with agressively-growing government subsidized foreign companies which have assured sources of capital and thus can price their products without concern for current earnings. The profitability of United States semiconductor firms is double or triple the profitability of the Japanese and European firms and the United States return on equity is double its foreign competition, despite almost exclusive United States reliance on equity capital. The United States companies raise most of their capital from retained earnings and equity investments while the average Japanese and European companies are able to borrow heavily, as evidence by the higher debt to equity ratios. This is what United States semiconductor executives call the "leverage gape." In simpliest terms, these data reflect the reasons why the United States semiconductor industry may grow less rapidly than our foreign competitors in the decade ahead.

	1978 Average After Tax Return on Equity	1978 After Tax Earnings As $ of Sales	1978 Debt/equity Ratio
Six U.S. companies	16.3%	6.4%	16%
Four Japanese companies	8.0%	1.9%	345%
Two European companies	9.6%	2.4%	47%

The above statement represents a common concern in the United States electronics industry that the higher debt/equity ratio in Japanese industry favors long term investment. The bank data described above may help us to understand why the Japanese bank system can seem to assume such high risk. The regional bank which specializes in electronics may not need to assume the entire risk of a firm borrowing heavily. That bank, which has stock owned in significant percentages by banks in a higher tier (either large central bank or insurance companies), may be able to pass substantial portions of that risk on to its owner banks. This sponsorship may allow the

regional banks which specialize in electronics to allocate higher loans to electronics firms. This may be even more the case since it may often occur that the financial institution which is loaning the money is at the center of a keiretsu and has ownership interests of its own in the electronics firm. This secondary ownership connection in Japan is also being explored. The infusion of inexpensive capital supports electronis firm in their commitment to growth, without undue short term demands for immediate profits.

United States firms, in contrast, may generally be faced with monthly or quarterly profit reports and demands from dispersed owners. Financial institutions, not backed by more powerful banks, are unable to finance firms with higher debt/equity ratios. As a result, the United States electronics firms may not have access to as much financial support as many Japanese firms. As Dr. Noyce indicates, this financial support may be a key factor in the future of the electronics industry:

> Given the increasing capital intensity in our industry and the need to increase R & D. . .the U.S. semiconductor industry in the 1980's will have to increase after tax earnings from an average of 4.3% during 1968 - 1977 to 13.5 % (or obtain equivalent tax or other financial incentives). . . Foreign government subsidies to semiconductor research and capacity were estimated at $2.0 billion . . . The key concern of the industry is its severe disadvantage in competing with aggressively growing, government-subsidized foreign companies which have assured sources of capital and thus can price their products without concern for current earnings. . . In the last analysis. . .access to capital may be the decisive factor in determining the world market share leader by the end of this decade.

D. A Trade Association Study

From preliminary discussion with trade association personnel in the United States and Japan and with industry leaders in the electronics field, the role of trade associations in the two cultures appear to differ. In the United States, when government agencies attempt to enact new legislation, the more powerful firms send representatives to interact with those agencies to lobby for industry interests. Dr. Noyce's testimony represents this type of action as he presented Intel's point of view to the Senate Subcommittee. It is possible that the intense, but uncoordinated efforts of numerous firms in the United States could cause more confusion

than direction in the relevant government agencies.[3]

In Japan, individual firms seldom interact directly with government agencies. Instead, the firms work together with other firms through associations to interact with government agencies. This more coordinated industry lobbying effort may have its rewards as the government agency is able to reasonably discuss industry needs and identify legislation which benefits both industry and government. Such coordination, often between otherwise competing firms, is another example of the intermediate governance mechanisms possibly available to the Japanese manager.

This project will consider the role of trade associations with the two cultures. Initially, it will describe the various activities that trade associations perform, as well as the size and relationships among the trade associations themselves. To this end, a list of United States electronics trade associations has been developed. As the study progresses, we hope to define some of the specific alternative trade association activities which can be followed to enhance the industry-government relations in both the United States and Japan.

V. PRESENTATIONS AT RESEARCH DESIGN AND FINDINGS

In research as complex and wide ranging as that summarized in this report, progress is greatly aided by presenting the proposed research design and tentative findings to academic, business, and government audiences for their criticisms and suggestions. Such presentations are also valuable in developing the ongoing academic, business, and government support that will be necessary to bring the research to fruition. To these ends, the principle investigator and members of the research team have discussed this research with numerous different groups. These groups have included: (1) the United States House of Representatives Committee on Science and Technology in the Rayburn building, hearings on research on organization and productivity (on July 28, 1981), (2) a delegation from the American Productivity Center on a trip to Japan, August 21-29, 1981 (the delegation included six congressmen, two senators, three assistant cabinet secretaries, two members of the White House Staff, five corporate

executives, and three academics), (3) the United States Navy Personnel Research and Development Center, in San Diego, California, June 5, 1981, (4) the Academy of Management Annual Meetings, August 2-5, in San Diego, California (5) the Western Academy of Management Meetings, Carmel, California, April 10, 1981, (6) the Office of Naval Research Contractors Conference in Orlando, Florida, January 29 and 30, 1981, (7) a briefing at the Office of Naval Research in Washington, D.C., on April 11, 1981, (8) the Japan Electronics Industry Association in Washington, D.C., on April 2, 1981, (9) in a special briefing for the Assistant Chief of Naval Material and staff in Washington, D.C., (10) to a two day colloquium presentation at the University of Washington, November 12 and 13, 1980, and (11) to groups of managers from the Lockheed Corporation, Rockwell International, and Westinghouse Corporation. Presentations of these findings are also scheduled to be made at the ORSA/TIMS National meetings, in Houston, Texas, as well as to the Japanese-American Management Conference in Lincoln, Nebraska on October 3-5, 1981. We will be continuing in these communication efforts.

VI. CONCLUSION

This paper has briefly described progress in an Office of Naval Research sponsored study of the United States and Japanese electronics industries. Continued work should provide insights into the nature of the Japanese and United States industries and begin to explain how the industrial structure allows United States and Japanese management techniques to operate. Two further points need to be made. First, while we are excited about the potential results of applying taxonomy analysis and efficiency models to the two industries, we realize that these are relatively new tools to the organization theorist. Because of their newness, we have been extremely careful to verify our study methods and conceptual frameworks with experts in the industry. Only through such joint academic/industrial interchanges can practical, yet conceptually sound models of industry structure and firm relationships develop. Second, one common criticism and interpretation of current research of the United States and Japanese industrial systems is the tendency among some to suggest that American firms should adopt Japanese management styles. We are in no way proposing this universal adoption

of another culture's industrial structure or management practices. Nor are we suggesting that one management style is universally better than another. Rather, we hope our research provides insights to both United States and Japanese managers in the operation of their firms. It is our belief that both countries can benefit from the appropriate adoption of efficient and effective management systems.

FOOTNOTES

[1]Again, the data for this analysis is under development. The ownership of Japanese banks comes from the Japan Company Handbook. The ownership of United States banks is more complex and is being complied from Federal Reserve information and from New York City and New York State information.

[2]The alternatives to selecting and working with one geographical locale in the United States is to work with all banks in the United States, which is too large a data set, or to work with the 100 largest banks in the United States. This latter option was not taken because it would not be comparable with all banks in Japan since the Japanese sample includes both local, smaller banks and larger national banks. New York City banks are a comparable data set in terms of composition of the banks, the number of banks, and the geographical dispersion of the banks.

[3]There is some evidence that firms in the United States are discouraged from such cooperative lobbying because of some potential anti-trust violations.

TABLE 1:

INFORMATION GATHERED ON

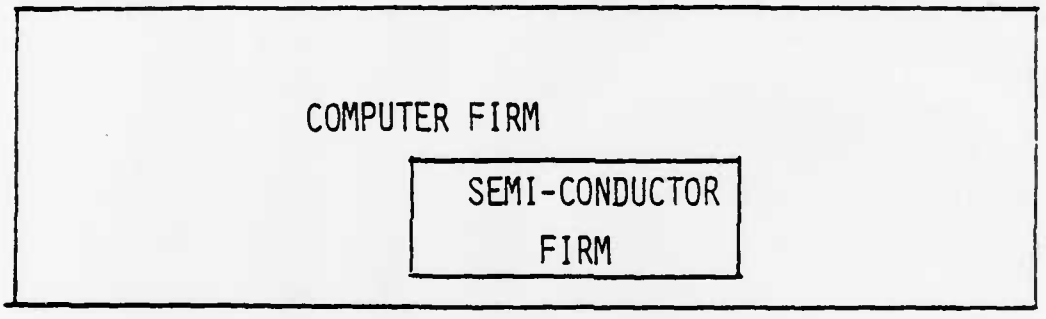
684 UNITED STATES AND 125 JAPANESE ELECTRONICS FIRMS

location	US state Japanese province
size of firm	number of employees (in 1978, 1979, 1980) sales volume (three years) number of plants
structure of firm	specialization ratio (used by Wrigley, 1970, and Rumelt, 1974) number of divisions number of divisions in electronics
market/technology matrix	yes/no questions to 10 alternative electronics markets (e.g. components, power generation/transmission, instruments, etc.) yes/no questions to six alternative technological activities within each market (e.g. manufacturers, markets, etc.)
financial data (three years)	revenues (sales) net income (profits) number of common shares current assets total assets current liabilities long term debt all debt shareholder's equity
transfer agent/bank references	bank that firms transact with
ownership data	beneficiary owners (own more than 5% of stock) and owner status (e.g. internal officer, member of Board of Directors, bank, industry, etc.)

FIGURE ONE:
EXAMPLE OF EFFICIENCY HYPOTHESIS:
US CASE OF COMPUTER AND SEMI-CONDUCTOR FIRMS

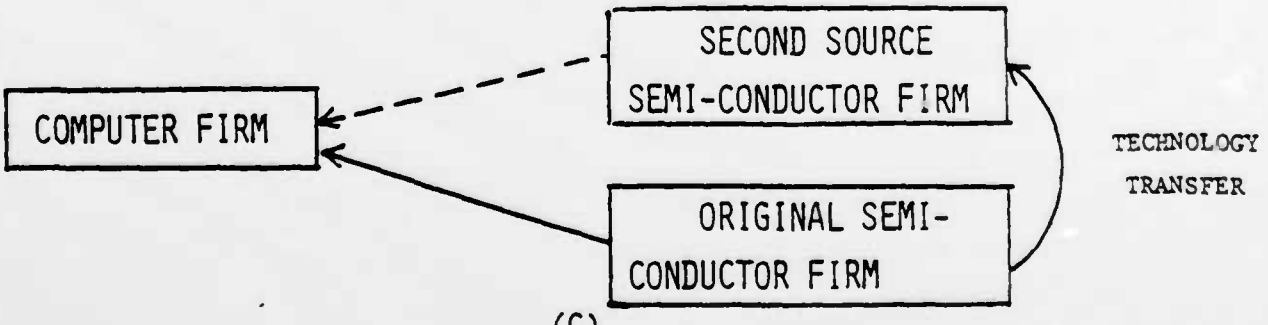
(A)

NO EXCHANGE



(B)

VERTICAL INTEGRATION



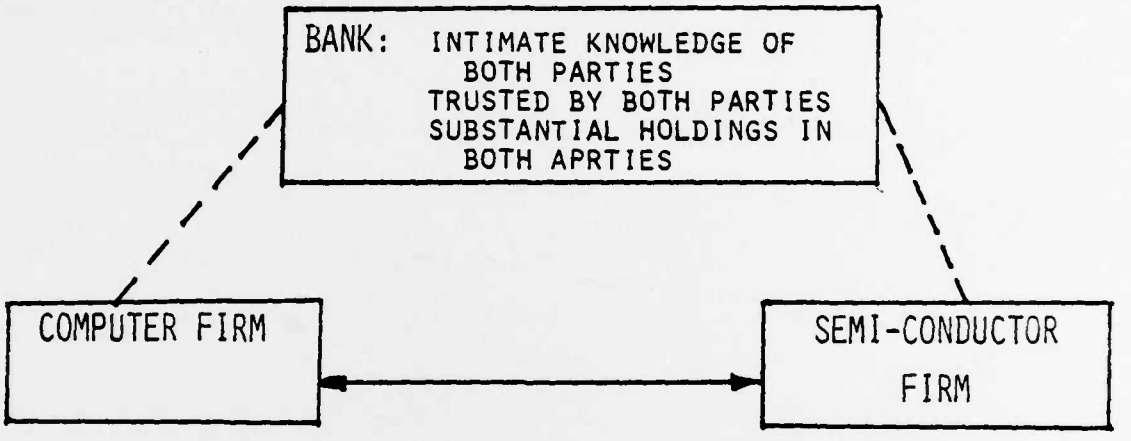
(C)

SECOND SOURCING

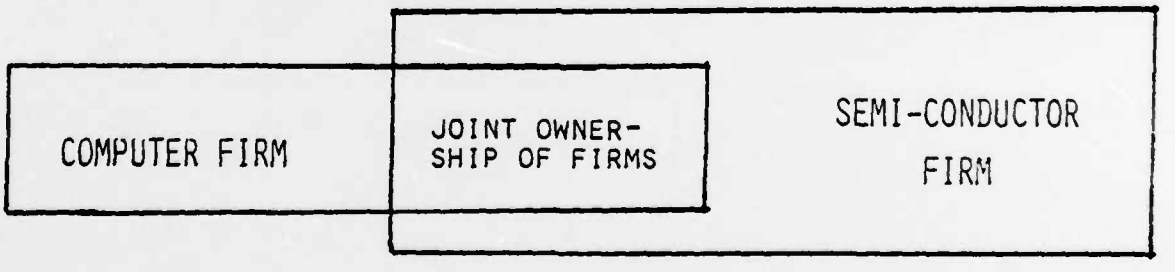
FIGURE 1 (CONT.)

EXAMPLE OF EFFICIENCY HYPOTHESIS:

INTERMEDIATE GOVERNANCE MECHANISMS



(A)



(B)

FIGURE 2: OVERVIEW OF VARIABLE-BY-FIRM

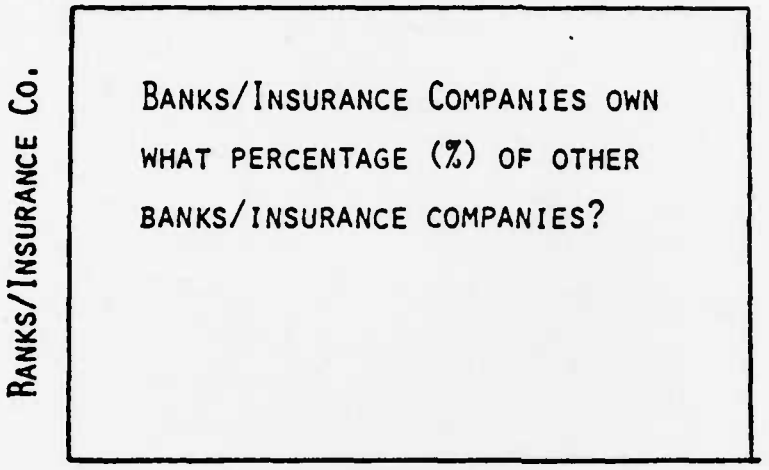
CLUSTERING MATRIX

	location	size	structure	market/technology	financial	transfer agent	ownership
UNITED STATES							
Firm 1							
Firm 2							
.							
.							
.							
Firm 680							
JAPAN							
Firm 1							
Firm 2							
.							
.							
.							
Firm 125							

FIGURE 3:

BANK/BANK RELATIONSHIPS

BANKS/INSURANCE CO.



BANKS/INSURANCE CO.

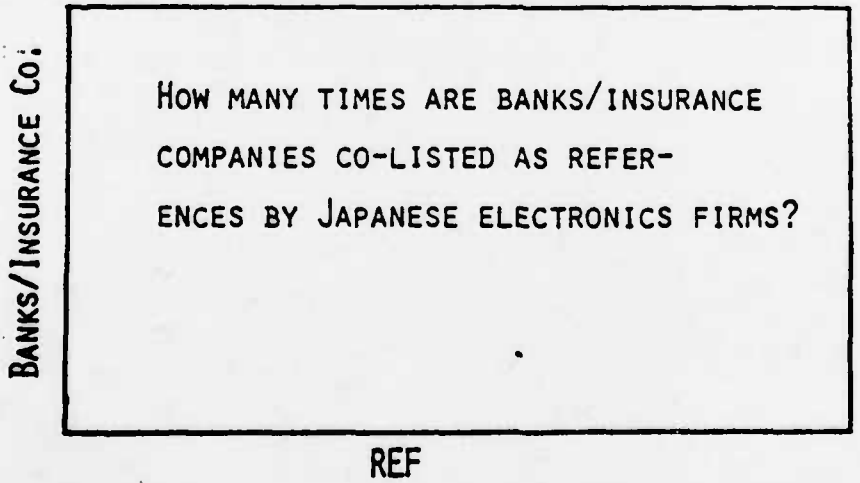
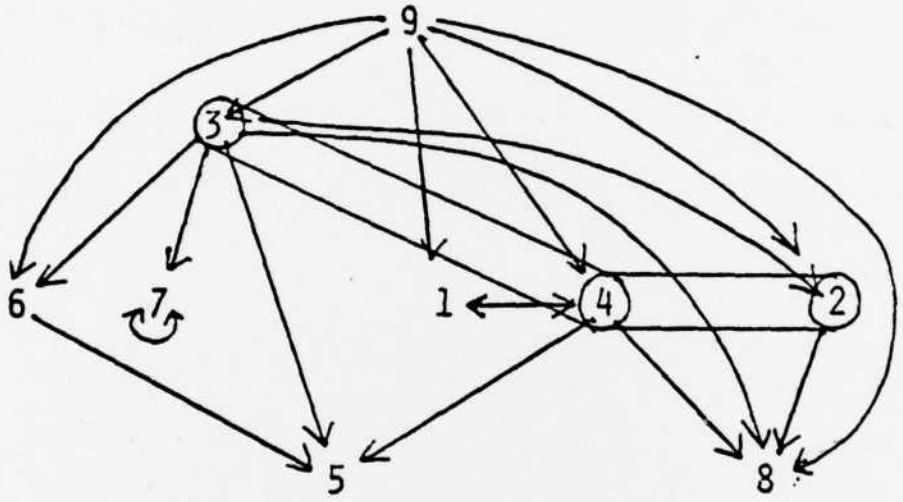


FIGURE 4



STRUCTURE OF JAPANESE BANKS

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May 1981

ELECTRONICS INDUSTRY STUDY

Secondary Data Code Sheet

_____(1-4) Company name:

_____(5-6) Address:

Phone Number

PRODUCT CATEGORIES (check = 1; blank = 0)

		Produces/ Manuf's Fabricates	Sells/ Markets	Distributes Services Installs	R & D Design Testing	Leases Rents	Other
1.	Electronic Components	(7)	(8)	(9)	(10)	(11)	(12)
2.	Power Generation/ Transmission	(13)	(14)	(15)	(16)	(17)	(18)
3.	Industrial/ Manufacturing Electronics	(19)	(20)	(21)	(22)	(23)	(24)
4.	Instruments	(25)	(26)	(27)	(28)	(29)	(30)
5.	Communications Equipment and Systems	(31)	(32)	(33)	(34)	(35)	(36)
6.	Consumer/Business Electronics	(37)	(38)	(39)	(40)	(41)	(42)
7.	Computer and Computer Devices	(43)	(44)	(45)	(46)	(47)	(48)
8.	Government/Military Electronics	(49)	(50)	(51)	(52)	(53)	(54)
9.	Transportation	(55)	(56)	(57)	(58)	(59)	(60)
10.	Other, Non-Electrical	(61)	(62)	(63)	(64)	(65)	(66)

_____(67-68) Total number of operating divisions

_____(69-70) Number of divisions in unrelated industries (non-electronics)

_____(71-72) Number of plants and facilities

_____(73-74) Number of acquisitions listed

Put a "1" in column 80 and Skip to column 7 of card 2

Transfer Agents: (Card 2) ____(7-9) ____(10-12) ____(13-15) ____(16-18)

____(19-21) ____(22-24) ____(25-27) ____(28-30)

	1978	1979	1980
Number of employees	____(31-36)	____(37-42)	____(43-48)
Revenues (sales) (000's)	____(49-55)	____(56-62)	____(63-69)
Net Income (profit) (000's)	____(70-76)	CARD 3: ____(7-13)	____(14-20)
Number of Common Shares (000's)	____(21-27)	____(28-34)	____(35-41)
Current Assets (000's)	____(42-48)	____(49-55)	____(56-62)
Total Assets (000's)	____(63-69)	____(70-76)	CARD 4: ____(7-13)
Current Liabilities (000's)	____(14-20)	____(21-27)	____(28-34)
Long Term Debt (000's)	____(35-41)	____(42-48)	____(49-55)
All Debts (000's)	____(56-62)	____(63-69)	____(70-76)
Shareholder's Equity (000's)	CARD 5: ____(7-13)	____(14-20)	____(21-27)
Specialization Ratio	____(28-29)	____(30-31)	____(32-33)
Electronics Specialization (yes=2/no=1)	____(34)	____(35)	____(36)
Electronics Related Ratio	____(37-38)	____(39-40)	____(41-42)

Ownership Information

1. _____(43-46)
2. _____(47-50)
3. _____(51-54)
4. _____(55-58)
5. _____(59-62)
6. _____(63-66)
7. _____(67-70)
8. _____(71-74)
9. _____(75-78)

Categories of Ownership

1 = industry
2 = bank/trust/finance company
3 = insurance company
4 = internal employees (stock plan)
5 = internal employees (officer)
6 = internal employees (Board of Director)
7 = internal employees (officer/BoD)
8 = private investor
9 = management firm


DATE
ILME